INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior

National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
Exp. Date (11/30/2010)
Form No. (10-226)

Reporting Year:	**Park:**	**Select the type of permit this report addresses:**
2009	Shenandoah NP	Scientific Study

Name of principal investigator or responsible official:	**Office Phone:**
Richard Stockton Maxwell	304-280-8565
Mailing address: West Virginia University Department of Geology and Geography P.O. Box 6300 Morgantown, WV 26506-6300 USA	**Office FAX** **Office Email** rmaxwell@mix.wvu.edu

Additional investigators or key field assistants (first name, last name, office phone, office email)

Name: Amy Hessl **Phone:** 304-293-8210 **Email:** amy.hessl@mail.wvu.edu

Project Title (maximum 300 characters):

Hydroclimate Reconstructions of the Potomac River Basin

Park-assigned Study or Activity #:	**Park-assigned Permit #:**	**Permit Start Date:**	**Permit Expiration Date:**
SHEN-00369	SHEN-2009-SCI-0017	Sep 16, 2009	Dec 31, 2009

Scientific Study Starting Date:	**Estimated Scientific Study Ending Date:**
Sep 16, 2009	Dec 31, 2009

For either a Scientific Study or a Science Education Activity, the status is:	**For a Scientific Study that is completed, please check each of the following that applies:**
Continuing	__ A final report has been provided to the park or will be provided to the park within the next two years __ Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park __ All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed

Activity Type:

Research

Subject/Discipline:

Watershed Management / Assessment

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

PROJECT SUMMARY

The Proposed Study

The Potomac River is the primary water resource for the Washington, DC metropolitan area supplying approximately 75% of the water demand (Kame'enui, Hagen, and Kiang 2005). Current management and modeling strategies in the Potomac River Basin (PRB) are constrained by the limited length and variability of the instrumental record of hydroclimate. In regions with short records of instrumental data, tree rings may be used as a proxy to extend the hydroclimate record. Unlike the western and central United States, the eastern United States has limited tree-ring records suitable for millennial-length reconstructions of climate. The primary

objectives of our research are to: 1) reconstruct the hydroclimate of the PRB for the last 1000 years using Juniperus virginiana tree-ring metrics, 2) utilize a multi-species approach to increase the seasonal window of hydroclimate reconstructions for the last 300 years, 3) evaluate the instrumental record of streamflow in the context of the past 1000 years of the proxy record, and 4) transfer hydroclimate reconstructions to water resource managers in the PRB to foster integration of tree-ring data into water resource modeling efforts in the eastern United States.

Intellectual Merit

The proposed research will generate one of five ultra-long (~1000 yrs) tree-ring chronologies for eastern North America and develop a novel multi-species reconstruction method utilizing existing tree-ring chronologies in the PRB. Our millennial-length record of hydroclimate will be constructed from old-growth Juniperus virginiana earlywood-, latewood-, and total-ring widths to capture the seasonal growth response to variations in climate. Additionally, we hypothesize that multi-species reconstructions from deciduous and coniferous species will increase the seasonal window of analysis in the proxy record of the past 300 years by exploiting phylogenetic differences in climate response among species. This novel approach will aid dendrochronologists in climate reconstructions in other regions where multiple species are present and will promote the use of existing tree-ring data to investigate water resource management issues in locations with limited instrumental records.

Broader Impacts of the Proposed Research

1) Benefits to Society- Our hydroclimate reconstructions will aid water resource managers in the PRB plan for future drought events by placing the instrumental record within the context of natural climatic variability of the past 1000 years.

2) Results disseminated broadly- We will work with the Interstate Commission on the Potomac River Basin and Lamont-Doherty Earth Observatory Tree-Ring Laboratory to foster integration of tree-ring proxy records of hydroclimate into water resource management and further regional reconstructions of drought in the United States. Results will be submitted for publication in relevant peer-reviewed journals and tree-ring data will be available for free on the International Tree-Ring Data Bank hosted by NOAA.

3) Promoting teaching, training, and learning- Presentation of our findings will promote applications of dendrochronology and the use of tree-ring records in water resource management across the United States. Ecological data collected during our research will be presented to The Nature Conservancy and the United States Forest Service.

4) Participation of underrepresented groups- Our laboratory is directed by a female researcher with extensive biogeographical research experience. Our current research has involved two female undergraduate assistants working towards honorsâ theses.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

No activity was conducted this report year due to limited fieldwork funding and time availability. However, my colleague, Joshua Wixom (WVU), will re-apply for a sampling permit for the 2010 field season and continue the project.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

No

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):	**Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):**
$0	$0

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural

Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.